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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/998,134	12/03/2001	Jeong Soo Kim	2332-0117P-SP	4564

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EXAMINER

PHAM, THANH V

ART UNIT PAPER NUMBER

2823

DATE MAILED: 01/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	09/998,134		KIM ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Thanh V Pham		2823	K16

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____   |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Response to Amendment*

1. Applicant's amendment to claim 5 overcome the Examiner's objection therefore the objection of claim 5 has been withdrawn.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2 and 4-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cheek et al. U.S. Patent No. 6,372,587 B1.

The Cheek et al. reference discloses a method for forming a junction in a semiconductor device comprising: providing a semiconductor substrate 105 divided into a first conductive type nMOS region and a second conductive type pMOS region (col. 9, line 66 to col. 10, line 12); forming a photoresist film 510 on the second conductive type MOS region; performing 'first' halo implant on the first conductive type MOS region at about a 25-65° tilt angle (col. 6, line 49) and performing a 'third' halo implant process 1200 (fig. 12) on the first conductive type MOS region, by using a tilt angle of about 0°.

The first halo implant is performed with an energy of 5-70 KeV and a dose of  $1.0 \times 10^{12}$  -  $1.0 \times 10^{14}$  ions/cm<sup>2</sup>; the third halo implant process is performed with a dose of  $1.0 \times 10^{14}$  -  $1.0 \times 10^{15}$  ions/cm<sup>2</sup> and with an energy of 3-50 KeV (col. 3, lines 27-38).

The Cheek et al. reference, in its invention does not use the 'second' halo implant (as labeled in claim 8 or as named in the second part of the first implant of claim 1) at twist angles of about  $0^\circ$  and  $180^\circ$  with an energy of 5-70 KeV and a dose of  $1.0 \times 10^{12}$  -  $1.0 \times 10^{14}$  ions/cm<sup>2</sup>; however, in the description of the related art, col. 2, line 66 to col. 3, line 3, the technique is mentioned *and is quoted as followed*: "After implanting one side of the structure 300, the semiconducting substrate 105 is typically rotated through  $180^\circ$  and the halo dopant 320 is again implanted so that the angle theta is the relative angle of the halo dopant 320 with respect to the upper surface 145 of the semiconducting substrate 105. **If** the mask 310 were not present, such symmetrical implanting of both sides of the structure 300 would result in symmetrical angled halo implants similar to the angled halo implants 135 in fig. 1".

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply this 'conventional halo implant' recognized by Cheek et al. with twist angles to improve the short-channel effect into the Cheek et al. structure because this 'second' implant *being performed at substantially the same doses* ( $1.0 \times 10^{14}$  ions/cm<sup>2</sup>) would reinforce the doping type of the substrate in the channel for the S/D extension and the LDD as taught by Cheek et al.

### **Response to Arguments**

4. The applicant alleges that "Cheek discloses performing the first and third implant processes at different doses by using different tilt angles, thereby performing non-symmetrical halo implant process" and "the Examiner admits that related art in Cheek

discloses halo implant process being performed at *substantially different doses* (see paragraph 5 of the Office Action)". Both statements are not true. The examiner re-quotes the 'conventional halo implant' recognized by Cheek et al. and underlines the provided facts ( $1.0 \times 10^{14}$  ions/cm<sup>2</sup>) in the Cheek et al. reference with the overlapped range for the two implants -which printed in the previous Office Action and repeated in the above rejection- to prove that Cheek et al. not only could performing a non-symmetrical but also symmetrical halo implant process in the 'if' statement; the facts that "[T]he first halo implant is performed with ... a dose of  $1.0 \times 10^{12}$  -  $1.0 \times 10^{14}$  ions/cm<sup>2</sup>; the third halo implant process is performed with a dose of  $1.0 \times 10^{14}$  -  $1.0 \times 10^{15}$  ions/cm<sup>2</sup> ... (col. 3, lines 27-38)" are understood that those implants have *substantially the same doses*. Nowhere in the previous Office Action "the Examiner admits that related art in Cheek discloses halo implant process being performed at *substantially different doses* (see paragraph 5 of the Office Action)".

### **Conclusion**

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956 until 2/4/04. See MPEP 203.08.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Thanh V. Pham whose telephone number is (703) 308-2543 until 2/4/04 and (571) 272-1866 thereafter. The examiner can normally be reached on Monday through Thursday from 6:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794 until 2/4/04 and (571)272-1855 thereafter. The fax number for this group is 703-872-9306 for before final submissions, 703-872-9306 for after final submissions and the customer service number for group 2800 is (703) 306-3329.

Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.

TP

TvP  
January 13, 2004

  
George Fourson  
Primary Examiner  
Art Unit 2823